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Title : GARCH Parameter Estimation using
Least Absolute Median

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The general autoregressive conditional heteroscedasticity, (GARCH) family has become more efficient in fitting financial data as it consists of the second order moment that measures the time-variant of the volatility data. However, GARCH may fail to fit some high frequency financial data with large jumps called outliers. In this research, GARCH parameters were estimated using least absolute median (LAM). The LAM estimator was developed using Bahadur

representation and Taylor expansion to speed up its iteration process. This research managed to obtain the asymptotic normal distribution for LAM-ARCH and LAM-GARCH. This asymptotic distribution was used to develop test statistics to test the performance of estimated parameters. This asymptotic distribution is an extension of the special case of quantile regression to the GARCH model. Iteration processes are needed to obtain the parameters. This was performed using the modified idea of least median square regression. Simple tests like the box plot and average absolute error, (AAE) were also used to test its performance. The model developed was then validated through simulation analysis and hypothesis testing. Based on the simulation analysis, the LAM estimator produced stable parameters

in terms of less variability compared to other estimators considered in this research. Hypothesis testing showed that the parameters are well estimated. Throughout the research, estimation method in the form of a LAM-ARCH model with asymptotic normal distribution is developed. The LAM-GARCH model, an extension from LAM-ARCH with asymptotic normal distribution together with its procedure to assess the performance of the estimated parameters is achieved. An autocorrelation test to

access the behaviour of the model based on its residuals and test statistics for assessing the performance of the methods developed. Applications to real data provide insights on the usability of the method developed using three data series. LAM can estimate good parameters of all the real series.